The Need for Joint Blue Force Situational Awareness Interoperability

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Submitted by Captain R.A. Hope
to
Major A.A. Angell, CG 11
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Interoperability is the foundation of effective joint, multinational, and interagency operations. The joint force has made significant progress toward achieving an optimum level of interoperability, but there must be a concerted effort toward continued improvement. Further improvements will include the refinement of joint doctrine as well as further development of common technologies and processes. Exercises, personnel exchanges, agreement on standardized operating procedures, individual training and education, and planning will further enhance and institutionalize these capabilities. Interoperability is a mandate for the joint force of 2020 – especially in terms of communications, common logistics items, and information sharing. Information systems and equipment that enable a common relevant operational picture must work from shared networks that can be accessed by any appropriately cleared participant.

Joint Vision 2020

Military forces have always had the need to know exactly where friendly units are located on the battlefield. However, since the battlefield is no longer a strictly linear construct, a new paradigm has emerged. Commands at all levels require the ability to view the common operational picture (COP). A pictorial representation of all units arrayed on the battlefield is necessary for a myriad of reasons; to track progress, to see the location and disposition of friendly or blue forces, and to prevent fratricide. The Army and the Marine Corps created separate, non-interoperable systems that provided the functionality of reporting and disseminating the real-time COP. However, Joint Blue Force Situational Awareness (JBFSA) interoperability must be established between the services to adequately secure military systems, to leverage the benefits of equipment commonality, and to enhance the Army and Marine Corps expeditionary nature.

Background

Currently, the Army and Marine Corps situational awareness systems are not interoperable. The Army developed Force Battle Command, Brigade and Below – Blue Force Tracker (FBCB2-BFT) while the Marine Corps developed the Digital Automated Communications Terminal (DACT) to transmit the position/location information (PLI) data or

blue force information. To display the COP, the Marine Corps uses Command and Control Personal Computer (C2PC) and the Army uses Maneuver Control System – Light (MCS-L)[1]; both are unable to directly share information due to different system architectures. To share this information, the PLI data must flow up to the joint Global Command and Control System (GCCS-J) server located at the joint task force (JTF) level headquarters and then back down through the services communications architectures. Simply, each major subordinate command (MSC) has a server that collects its subordinate's PLI data and reports the MSCs aggregated PLI data to the server at the next higher command. For example, PLI data from a company would be routed to a battalion, then to a regiment, and so on, ultimately to a joint level headquarters where the GCCS-J server is located.

To illustrate the problem, an Army and a Marine Corps infantry battalion, working along the same road, would have to pass all of their PLI data up to the GCCS-J server and back down to see the location and disposition of the other's units; even though they may be a few hundred meters from each other. No horizontal sharing of information

[1] James M. Robinson, "Interoperability Considerations for Blue Force Situational Awareness System Architectures" (Thesis, Naval Postgraduate School, 2007), 9.

between the Army and the Marine Corps exists. JBFSA interoperability is further complicated by the requirement to provide specialized units, such as Special Operations Command (SOCOM) forces, with devices restricted in the use of commercial communications systems due to security requirements.[2] Currently, the Marine Corps uses the Army FBCB2 to share the COP across all units operating in the Central Command area of operations.

The Army and Marine Corps transmit PLI or blue force data three ways: through the National Technical Means (NTM) domain, the Satellite Communications (SATCOM) domain, and the Line-of-Sight (LOS) domain.[3] The NTM and SATCOM domains use communications satellites. The LOS domain uses ultra-high frequency (UHF) radios that communicate directly from the reporting device to the radio at the higher headquarters. This transmission path is problematic due to the large distances that units operate away from higher headquarters and the fact that these radios must be within range of each other. The SATCOM domain uses military and civilian satellites to report unclassified PLI data, while the NTM domain strictly uses national assets governed by the National Reconnaissance Office (NRO) to report

[2] Robinson, “Interoperability”, 2.
[3] Robinson, “Interoperability”, 37.

classified PLI data. These NRO assets are primarily used by SOCOM. Classification of the two communications means is a very important distinction because this introduces the problem of access to the Secret Internet Protocol Router Network (SIPRNET). The NTM domain injects PLI data directly onto the SIPRNET, while the SATCOM domain relies upon a one-way filter to enable unclassified PLI data to cross over onto the SIPRNET.[4]

Security of Blue Force Information

Information security is paramount during combat operations.[5] Allowing the enemy to know the location and disposition of units can prove disastrous as was seen with the finding of Special Order No. 191 during the American Civil War.[6] The Army classifies FBCB2 as sensitive but unclassified (SBU). If the commercial systems are encrypted properly and approved by the National Security Agency (NSA) for Type 1 encryption[7], then the use of commercial systems is irrelevant to the need for a SBU

[4] Robinson, "Interoperability", 42.
[5] Robinson, "Interoperability", 56.
[6] Stephen W. Sears, *George B. McClellan: The Young Napoleon* (New York: Ticknor and Fields, 1998), 280-281. Special Order No. 191, dated September 9 [1862] was [GEN] Lee's operational plan for the capture of Harper's Ferry during the American Civil War. This order was found by Union soldiers and revealed very detailed and specific information on the location and disposition of Confederate forces prior to the start of the battle, enabling GEN McClellan to employ Union forces more effectively.
[7] Type 1 encryption - Cryptographic equipment, assembly or component classified or certified by NSA for encrypting and decrypting classified and sensitive national security information when appropriately keyed.

classification. However, classifying this system as SBU allows the Army to install these systems in most of their military and civilian vehicles, including Army and Air Force Exchange Service (AAFES) trucks and contractor vehicles; regardless of the clearance held by the driver.[8]

The FBCB2 system automatically reports the using unit's current position, providing and displaying near real-time position reports of all units on the battlefield to the user. If this system is compromised, the enemy can use this information to target or avoiding friendly units operating in their areas.

Enhancing Expeditionary Capabilities

FBCB2 works relatively well in the current static operating environment, where units are located on semi-permanent forward operating bases. However, major problems with the current system have surfaced. As more systems are installed on the already limited network, bandwidth issues become readily apparent, degrading its effectiveness.[9] Any future JBFSA system that is developed must be expeditionary.[10] It must be scalable, available for use during training, and ready to deploy with minimal

[8] Robinson, "Interoperability", 60.
[9] Robinson, "Interoperability", 37.
[10] MCDP 1-0 defines Expeditionary Operations: A military operation conducted by an armed force to accomplish a specific objective in a foreign country.

coordination. The rapid nature of expeditionary operations does not lend itself to satellite service contracts. These service contracts require prearranged payment plans for system usage. Additionally, some geographical locations in the world lack satellite coverage.[11] Units such as Air Contingency MAGTFs (ACM) [12], Marine Expeditionary Units[13], or the 82d Airborne Division[14] require the ability to deploy to any location worldwide and seamlessly tie into the GCCS-J architecture.

Imagine establishing a cellular phone contract that allows service only in Virginia, but then moving to California. Another contract would have to be established authorizing cellular service in California before a phone call could be made. However, before the move was completed, you were ordered to move to Alaska; necessitating another change in the service contract.

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[11] Robinson, "Interoperability", 79.
[12] ACM "is an on-call, combat-ready task organization that can begin deployment by strategic airlift within 18 hours of notification." U.S. Marine Corps, MCDP 3: Expeditionary Operations, 1998 (US Govt), 80.
[13] Mission of the MEU is to "Provide a forward deployed, flexible, sea based MAGTF capable of rapidly executing Amphibious Operations, designated Maritime Special Operations, MOOTW, and Supporting Operations to include enabling the introduction of follow-on-forces." U.S. Marine Corps, MCO 3120.9B: Policy for Marine Expeditionary Unit (Special Operations Capable) (MEU(SOC)), 2001(US Govt), 2.
[14] 82d Airborne Division, http://www.bragg.army.mil/82DV/Mission.html: "Within 18 hours of notification, the 82nd Airborne Division strategically deploys, conducts forcible entry parachute assault and secures key objectives for follow-on military operations in support of U.S. national interests."

Along the same lines, expeditionary operational requirements are not predictable.

One could argue that it would be easier to continue to utilize FBCB2. However, this argument fails on two major points. First, FBCB2 is heavily reliant on satellite communications with its attendant bandwidth[15]/latency[16] issues. The potential latency of thousands of FBCB2 systems using limited satellite bandwidth is increased dramatically. Secondly, it is limited by civilian contractual agreements. The use of satellite services for FBCB2 cost the Army $24 million per year to operate just in theater.[17] With budgeting constraints impacting operational readiness, it is unlikely that the DOD would spend money to have satellite coverage available in all parts of the world. The focus should be on establishing an expeditionary system that is not contractually dependent

[15] **Bandwidth -** the amount of data that can be carried from one point to another in a given time period (usually a second). Whatis.com, URL:<http://searchnetworking.techtarget.com/sDefinition/0,,sid7_gci211634,00.html>, accessed 4 January 2008.

[16] **Latency –** "Although intercontinental television signals travel at the speed of light, they nevertheless develop a noticeable [lag] over long distances. This is best illustrated when a newsreader in a studio talks to a reporter half way around the world. The signal travels via communication satellite situated in geosynchronous orbit to the reporter and then goes all the way back to the studio, resulting in a journey of almost one hundred thousand kilometers. Most, but not all of this latency is distance-induced, since there are latencies built into the equipment at each end and in the satellite itself. Reference.com, URL:<http://www.reference.com/browse/wiki/Latency_%28engineering%29>, accessed 4 January 2008.

[17] Robinson, "Interoperability", 76.

and can be managed internally by the military with minimal coordination or expenses.

Benefits of JBFSA Equipment Commonality

Establishing equipment that can be used by either service will greatly enhance joint mission success through increased interoperability. Units who attach to different services should be able to utilize the same equipment and “plug and play” into the gaining unit’s system architecture. Using the cellular phone example, how much easier is it to move from one state to another, knowing that your phone will work with no adjustments. This approach will also allow for a common source of supply for all services, keeping overall maintenance costs down. Any upgrades in capabilities or equipment will apply to all services and will reduce the possibility of developing future stove-piped systems. FBCB2 can only be used in theater, forcing units to learn to use the equipment only in an operational environment. Since the system will be available during training in CONUS, units will be able to conduct exercises and operations using the same equipment they will use when deployed; developing and honing tactics, techniques, and procedures.

JBFSA equipment commonality will also enhance joint capabilities. Units at the tactical level must be able to

move around the battlefield to support different units or services with little to no changes in their system reporting procedures. Designing a jointly employed and developed system will ensure that the ideas and improvements that benefit one military service will benefit all services. Also, the benefits of planning, operating, and maintaining one JBFSA system during combat operations, or in garrison, greatly outweigh the perceived benefits of a single-service oriented, stove-piped system.

The Way Ahead

The Joint Requirements Oversight Council directed the convergence of Army and Marine Corps BFSA systems in 2003.[18] There are many ideas currently on the table to improve upon the current system. Future systems will be required to facilitate sharing data and information at the tactical level. The goal is to have "[the] ability to turn on a BFSA device, then send and receive situational awareness data across any available communications path without having to do anything special…."[19]

Furthermore, instead of pushing information up the chain of command to different staff sections, via separate reports such as personnel status, maintenance status,

[18] Robinson, "Interoperability", 3.
[19] Robinson, "Interoperability", 11.

situation reports, casualty reports, etc., this new system could potentially have the ability to pull information from unit icons as they appear on the COP. These icons would contain detailed information pertaining to that specific unit. Instead of unit icons only representing the last reported position of that unit, the icons would contain more detailed information.

Higher headquarters would be able to “pull” unit status reports by simply clicking on the icon and selecting the type of information they need. Higher headquarters would virtually “see” the maintenance readiness status, personnel status, casualty reports, and supply status, etc., of any unit within their hierarchy. This information would be derived, maintained, and aggregated by each unit in the chain of command, reducing the need to submit several different reports to higher headquarters. Those headquarters elements with the need to see the information would be able to click on that unit icon and read the information; filtering the information they do not need, similar to the Marine Corps Total Force System (MCTFS).

FBCB2 relies heavily on commercial satellite access. This dependency is not ideal or desirable. Unencrypted commercial systems not under the control of the military, significantly degrades the Army and Marine Corps’ combat

effectiveness. Moreover, the government has to pay for service, therefore reducing the likelihood of using this system in a training environment. The military services can only afford to use the system in theater as the expense for use during training is prohibitive. This negatively impacts training and puts deploying units at a distinct disadvantage. Units cannot leverage the FBCB2 to its utmost potential since all usage is in real world situations; leaving little to no opportunity for experimentation.

Creating a system that can operate via satellite as well as terrestrially with no end-user interaction would be tremendously beneficial. This capability would be akin to Apple's iPhone™ which can use the cell phone network or seamlessly transition into a Wi-Fi network for more efficient internet service.[20] This capability potentially reduces satellite service costs and will lead to an increased efficiency of limited bandwidth. Of note, SIPRNET wireless networks have already been approved for use within the Department of Defense.

[20] Apple iPhone™ URL:<http://www.apple.com/iphone/features/index.html#wireless>, accessed 4 January 2008.

Conclusion

The requirement for an interoperable JBFSA system is very important due to the high level of joint operations conducted by the Army and Marine Corps. The highly decentralized and chaotic battlefield environment requires a system that is secure, expeditionary, and standard across the services. The military should be wary of becoming overly reliant on commercial transmission systems. Doing so hinders the Army and Marine Corps' ability to deploy at a moment's notice around the world. The military should combine their standard requirements and push ahead toward an interoperable system, a solution that will greatly enhance the commander's ability to command and control.

1,969 words

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